

REMARKS

Claims 43-74 are pending in this application. Reconsideration in view of the following remarks and evidence of secondary considerations submitted herewith is respectfully requested.

The Office Action rejects claims 43-74 under 35 U.S.C §103(a) over Stuetz (U.S. Patent No. 4,397,321). The rejection is respectfully traversed.

The Office Action states on pages 2-3, beginning on page 2, third paragraph:

Stuetz discloses nearly all that is recited in the claims, since it discloses a cut filler composition, for use in a cigarette, comprising tobacco having uniformly dispersed therein a catalyst composition which can consist of a combination of manganese oxide and/or iron oxide, and potassium and/or calcium oxides (corresponding to the claimed 'at least one additive capable of acting as an oxidant....and/or as a catalyst') (see entire reference). While Stuetz may not specifically state that the catalyst particles are in the form of nanoparticles, it does state that the efficiency of toxic material reduction in smoke delivered by the disclosed catalyst *increases* as the particle size of the catalyst *decreases*. Also, Stuetz states that a lessened amount of the catalyst is required when a "colloidal" metal oxide catalyst is used. (Note: Brady et al. ('Fundamentals of Chemistry') states that 'colloidal' mixtures are those in which the particles of at least one of the substances have a dimension in the range of 1 – 1000nm (corresponding to the claimed 'nanoparticles') (see page 409)). Therefore, it would have been obvious to one having ordinary skill in the art at the time of the invention to utilize the catalyst of Stuetz as a colloidal dispersion, with the above particle size range, in order to require a lessened amount of catalyst and enable an increased efficiency of reduction of toxic components in cigarette smoke.

The rejection is respectfully traversed on the basis that (1) Stuetz provides no incentive or motivation to use iron oxide nanoparticles and on the basis that (2) any *prima facie* case of obviousness based on Stuetz is rebutted by evidence of unexpected results submitted herewith.

Regarding point (1), it is well established that:

[o]bviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either explicitly or

implicitly in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See MPEP § 2143.01, page 2100-125.

However, Stuetz does not teach use of iron oxide nanoparticles. Further, while colloidal manganese dioxide is disclosed in Stuetz, there is no teaching, suggestion or motivation in Stuetz to use colloidal iron oxide as a catalyst. With respect to iron oxide nanoparticles, Applicants advise that iron oxide nanoparticles were not commercially available until years after the Stuetz patent issued (see paragraph 6 of the Declaration Under 37 C.F.R. §1.132 of Ping Li submitted herewith). To the extent that iron oxide nanoparticles were not commercially available at the time the Stuetz patent was filed and because Stuetz does not teach any process for making such nanoparticles, it is submitted that the rejection based on Stuetz alone fails to establish the requisite incentive/motivation to modify Stuetz in a manner which would produce the claimed invention.

Regarding point (2), rebuttal evidence relating to secondary considerations must be considered by the Examiner in deciding whether or not to maintain a rejection under 35 U.S.C. §103(a). MPEP §716.02(a), sets forth that "[a] greater than expected result is an evidentiary factor pertinent to the legal conclusion of obviousness ... of the claims at issue." See MPEP §716.02(a), citing *In re Corkill*, 711 F.2d 1496, 226 USPQ 1005 (Fed. Cir. 1985). Further, "[e]vidence that a compound is unexpectedly superior in one of a spectrum of common properties ... can be enough to rebut a prima facie case of obviousness." See MPEP §716.02(a), citing *In re Chupp*, 816 F.2d, 646, 2 USPQ2d 1437, 1439. As explained below, the Li Declaration shows that a significantly lower amount of iron oxide nanoparticles

than colloidal manganese dioxide can be used to achieve a comparable carbon monoxide reduction.

According to Stuetz, about a 37% reduction of carbon monoxide to carbon dioxide can be achieved for "55 mg/cigarette of colloidal manganese dioxide." See Stuetz, col. 3, lines 3-10. While Stuetz does not explicitly state the tobacco content for the "cigarette" used with the 55 mg /cigarette of colloidal manganese dioxide, presumably the cigarette is 1 gm of tobacco as 1 gm of tobacco was used as the "control" for Tables II and III, while in Tables I-III and VI, the additives were presented as "Per gm of Tobacco." Accordingly, for comparison purposes the concentration of catalyst per gram of tobacco will be used.

In rebuttal evidence in the Li Declaration, the concentration of iron oxide nanoparticles in tobacco was tested at 24 mg/0.74 g of iron oxide nanoparticles/tobacco for Test 1 and 26 mg/0.72 g of iron oxide nanoparticles/tobacco for Test 2. For comparison purposes, the concentration of iron oxide nanoparticles catalyst per gram of tobacco can be extrapolated, i.e., 24 mg/0.74 g and 26 mg/0.72 g of iron oxide nanoparticles/tobacco can be extrapolated to about 32 mg/1 g and about 36 mg/1 g, respectively.

As a result of the extrapolation, the amount of catalysts can be compared for concentration as well as carbon monoxide reduction. As set forth in Test 1 of the Li Declaration, tests were conducted with about 24 mg of iron oxide nanoparticles per 0.74 g of tobacco (extrapolated to about 32 mg of iron oxide nanoparticles per 1 g of tobacco for comparison purposes). See the Li Declaration. As set forth in Test 2 of the Li Declaration, tests were conducted with about 26 mg of iron oxide

nanoparticles per 0.72 g of tobacco (extrapolated to about 36 mg of iron oxide nanoparticles per 1 g of tobacco for comparison purposes). See the Li Declaration.

Therefore, by comparing the reduction of carbon monoxide by Stuetz' colloidal manganese dioxide to the reduction of carbon monoxide in Tests 1 and 2 in the Li Declaration, it can be seen that comparable carbon monoxide reduction can be achieved using significantly lower concentrations of iron oxide nanoparticles. As such, it is submitted that the claimed invention achieves unexpected results in that a lower amount of the iron oxide nanoparticles surprisingly provides a comparable reduction in carbon monoxide versus the much higher amount of colloidal manganese dioxide taught by Stuetz.

Because Stuetz fails to provide the necessary incentive/motivation to use iron oxide nanoparticles and in view of the unexpected results established in the Li Declaration, any *prima facie* case of obviousness based on Stuetz is deemed rebutted. Withdrawal of the rejection is therefore respectfully requested.

CONCLUSION

From the foregoing, further and favorable action in the form of a Notice of Allowance is earnestly solicited. Should the Examiner feel that any issues remain, it is requested that the undersigned be contacted so that any such issues may be adequately addressed and prosecution of the instant application expedited.

Respectfully submitted,

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Enclosure: Declaration under 37 C.F.R § 1.132 by Ping Li